A Project Report

On

Crowd Management Practices at Puri Jagannath Temple during Important Festivals

BY

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Certificate

This is to certify that the project report entitled "Crowd Management Solutions at Puri Jagannath Temple" submitted by Mr. Suman Sekhar Sahoo (ID No. 2021A7PS2605H) in partial fulfillment of the requirements of the course HSS F266, Study Project Course, embodies the work done by him under my supervision and guidance.

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ABSTRACT

The Jagannath Temple in Puri, Odisha, is one of the most significant Hindu pilgrimage sites, attracting millions of devotees annually. Efficiently managing the massive influx of visitors during festivals and peak seasons is a significant challenge. This report, is a continuation of the previous report that focused on describing the current management practices along with highlighting shortcomings of the current management practices. This report aims to develop comprehensive crowd management solutions that addresses the current shortcomings.

Chapter 1 delves into crowd turnout estimation, a crucial prerequisite for effective crowd management. It suggests the usage of modern technologies for accurately calculating the visitor turnout, crowd density and many more parameters useful for prevention of Stampede. Chapter 2 focuses on regulating devotees for a smooth darshan by proposing a new token system, that would solve for overcrowding and huge wait times. Whereas the Chapter 3 covers essential support services necessary for ensuring the well-being and convenience of visitors. It encompasses aspects like access to drinking water, restroom facilities, medical aid, lost and found services, and emergency response protocols.

CONTENTS

Background and Preliminaries

 The previous part of the report described the current crowd management practices of the Puri Jagannath Temple. The key problems identified were:

- Despite the large crowd influx and the need for efficient crowd management, the temple lacks any advanced technological systems to accurately measure and monitor the turnout of devotees visiting the premises.
- The temple currently has no system in place to limit or cap the number of devotees entering the premises within a given hourly period, potentially leading to overcrowding and congestion issues.
- Devotees wait in queues for long hours without being provided with food, water and toilet access.
- The temple lacks a comprehensive emergency contingency plan to handle potential stampede situations. It has no properly trained personnel and communication systems to direct/control people. It has an onsite mini-hospital[i] but can accommodate only 2-3 patients and has basic facilities.
- The administration lacks proper coordination with temple servitors- which is seen in the form of delayed performance of rituals. Lack of proper regulations of their (servitors) power and behaviour towards devotees have sometimes lead to physical violence inside the temple. The servitors accuse SJTA for cause of various issues[ii].

This part of the report will focus on devising a comprehensive crowd management solution by addressing all of the above shortcomings.

Chapter 1: Crowd turnout estimation

Estimation of number of visitors is crucial for efficient crowd management. It helps in the following ways:

- Crowd turnout estimation enables the administration to assess if the number has surpassed safe capacity limits, allowing them to restrict further entry and prevent overcrowding.
- Knowing the expected crowd size allows the administration to allocate resources appropriately. This includes staffing of police to manage queues and regulate entry of crowd in batches, wheelchair supply and attendants, Battery vehicles for senior citizens and preparation of appropriate number of beds in nearby hospitals in case of emergency.

Currently, the temple has no system/technology in place for counting devotees. While they likely rely on rough guesstimations, which often turns out to be inaccurate, (This is evident from past experiences, where estimations often fall short of actual turnouts. For example, Ranjan Das (SJTA chief) predicted 3-4 lakh[iii] devotees for New Year's Day 2024, while the actual turnout exceeded 5 lakh[iv].) real-time insights are necessary for optimal crowd management during large scale events.

More than just getting the count of visitors, a comprehensive "crowd monitoring" system can significantly improvize the efficiency of crowd management.

Crowd Monitoring
Crowd monitoring involves gathering real time footage of the crowd and analyzing the crowd numbers, density, movement patterns, detection of anomalous behaviour (like theft, bomb implanting) or any other potential issues to ensure safety and the smooth flow of crowd. Crowd monitoring includes:

- Monitoring the overall number of people (to ensure the safe venue capacity is not exceeded)
- Monitoring the distribution of people (to help prevent local overcrowding)
- Identifying potential safety and security threats to the crowd. (to prevent the escalation of public disorder)

Implementing Crowd Monitoring

Some of the crowd monitoring solutions that are suitable for large turnout events in Jagannath temple are:

CCTV with Computer Vision software

Standard security cameras placed at strategic locations that capture real time video footage feed data to the computer vision program that uses advanced algorithms to:

- Count number of devotees
- Calculate density and notify if it crosses a safe limit
- Track movement
- Behaviour analysis (Some systems can even analyze crowd behavior to detect anomalies like sudden surge in number, stampedes, or suspicious activity)
- With data being fed into Machine learning model over long period, it can classify a situation to be stampede prone or not with given parameters like count of people at queue, their movement speed etc.

Another similar solution would involve thermal cameras instead of regular CCTV cameras. CCTV cameras raise privacy concerns due to surveillance of individuals without their consent. And in certain cases, the Computer Vision software cannot recognize humans with their faces covered. Thermal cameras solve both these problems and provide more accurate outputs.

Tokens with RFID

Tokens with RFID built in could be given out to devotees (producing valid ID cards) as entry tickets. RFID tokens emit radio waves that can be used to track devotees. RFID readers can be placed at strategic locations (like Baisi Pahacha, Natamandira, Ananda bazaar etc.) which can detect and record the unique identifiers of RFIDs with great accuracy. The data received by RFID readers can provide information about precise location of devotees which can be used to calculate crowd density, track movement, speed etc. This data can be fed into software running machine learning algorithms to produce same analytics as above with higher accuracy. But this system comes with its downfalls. The devotees might lose their tokens or take it back with them. Therefore the efficiency of it's working depends upon the crowd's discipline and responsibility. This problem could potentially be solved by enforcing penalties against those not returning the tokens within a stipulated time (Penalty notice can be sent to the phone

number linked with ID that was produced while collection of tokens). Yet, losing of RFID tags would have major cost implications. Due to its ability to locate people with high accuracy, it can be used to track only a subset of the crowd that is vulnerable to getting lost viz. senior citizens, children and people with disabilities. This system is already being used in Sabarimala to track child pilgrims[v].

In conclusion, thermal cameras along with analytics software could be used to monitor the crowd and estimate crowd turnout and RFID wristbands could be issued to senior citizens, children and people with disabilities at designated counters (possibly near phone and footwear stands) to track them in case they get lost.

Chapter 2: Regulating devotees for a smooth darshan

The temple currently follows a traditional system where no tickets/tokens are used, devotees are allowed entry at any time when the temple is open. While this free system offers flexible visit planning for devotees, it comes with drawbacks that significantly contribute to the issue of overcrowding and stampedes. Issues with this system:

- Devotees residing in other parts of Odisha make up the bulk of visitors of Puri[vi]. They often plan such that they reach back home on the same day. Therefore, a majority of crowd arrives at a particular timeframe with peak at 9AM-12PM[vii]. This is also the timeframe where maximum number of trains arrive[viii], adding up to the already huge turnout. This creates a non uniformly distributed influx of devotees with peak interval exceeding safe capacity limits of the temple especially during special occasions, which poses a significant health hazard to the crowd.
- If the administration chose to adhere to safety limits, it would result in significantly long waiting periods in queues for devotees (which they cannot even leave). In practice, they compromise public's safety by allowing above crowd in numbers safety limits, brewing perfect conditions for stampedes to occur and providing devotees with a poor darshan experience.

To solve the issue of public safety which is highly probable during special occasions, it is absolutely necessary for the administration to introduce a cap on the number of devotees allowed to be inside the temple premises. It is difficult to maintain order in large crowds and hence difficult to effectively manage if any emergency situation like a stampede occurs. By limiting the number of devotees allowed inside at once, these risks can be significantly reduced. Thus allowing for a safer and more enjoyable experience for everyone.

But the downside of this solution is- even higher wait time for devotees. Tirupati's Regular Sarva Darshan (not SSD that is currently being followed) was based on only this solution of capping the maximum number of devotees. Hence it had huge waiting times of around 12-15 hours.

To solve the high wait time problem, what if we could assign a particular time slot for darshan for a devotee? Instead of standing in long queues in the uncertainty of when they would get a darshan without food, water and access to toilets, they can choose to arrive at their assigned slot or take leisure around the temple in the meantime. This would help disperse the overcrowding in the form of queues near the temple, eliminate the unproductive time wasted in standing in queues, and possibly benefit the economy in and around the temple by increasing revenues of the local vendors, hotels (devotees from far off places arriving early with respect to their slots by train would more likely reside in hotels), restaurants etc.

Putting both the solutions together, the system would operate as follows: A whole day would be divided into fixed time slots, each slot would be assigned to a maximum of CAP number of devotees. Each devotee is allowed to enter only in their assigned slot and exit within the same slot.

Implementing time slotted entry- Introduction of Tokenized system

A tokenized entry system can incorporate both solutions. By having a maximum of CAP number of tokens available per timeslot, the system solves the problem of crowding above capacity and long waiting times. The distribution of tokens can be made via two channels- online and offline. Offline tickets could be made decentralized by making them available at public offices like Post offices across Odisha. It is to be noted that tokens available online and offline are disjoint i.e, they are maintained independently and if online tokens are sold out quickly, offline tokens are not transferred to online tickets. This is to ensure fair chance is given to those incapable of booking online tickets. To prevent hoarding of tickets, devotees need to produce ID cards and the maximum number of tickets that can be bought by a devotee in a single day/month shall be capped.

On regular days when the crowd turnout is manageable and waiting time in queue is less, the tokenized system would be an unnecessary overhead. Therefore, this institution of a Tokenized system could be introduced only for days of special occasions. Proper advertisement of the system through newspapers, TV, radio, banners infront of Post offices and other forms of media should occur well in advanced, giving time for the spread through word of mouth. Furthermore, a time progresses this norm will become common knowledge, and people will follow accordingly.

One of the possible downsides of this system could be that it can accommodate only a fixed number of devotees (a fairly large number) that could obtain a token for that particular special occasion. Another would be if somehow a devotee misses entry in their slot, their token gets invalid and cannot accommodate them in next slots. Although harsh, but this is the basic working principle of this system.

Crowd Flow Management

The introduction of token system during special occasions, would ensure safety of devotees by not allowing the devotees entrance above capacity. But ensuring that the devotees complete their darshan within the allotted timeslot would require authorities to design a crowd flow system. Overcrowding and potentially stampede can still be occur if crowd is concentrated in a particular area. Installation of proper signage describing the route to be followed would avoid any confusion and streamline the crowd flow in a single way traffic flow. Deployment of security personnel at strategic locations would help ensure that the crowd is continuously moving and not building up concentration at a single area.

Chapter 3: Essential support services

While the regulation of flow of devotees for a smooth darshan is crucial for crowd management, ensuring the availability of essential support services and facilities would enhance the overall experience of devotees.

Communication of information

Clear communication of information is crucial when authorities plan to adopt any special measure or use a new system (like tokenized entry system) during special occasions. It could also be used to provide the following information to the devotees waiting in queue:

- Real time updates on the expected waiting time
- Ritual schedule
- Safety guidelines in case of emergency
- Availability of wheelchairs

These information could be communicated via several channels like- public announcements, display boards, updates on social media or website.

Proactive communication (with help of clear signage) highlighting the onsite facilities like dedicated queues, availability of wheelchair and electric shuttle vehicles for senior citizen and people with disabilities, is crucial to prevent underutilization of these facilities.

Regulation of servitors and ensuring timely conductance of rituals

Historically, long queues and huge waiting times have stemmed from delayed conduction of rituals[ix]. These holdups arise from diverse issues, ranging from missing resources to conflicts among servitors[x] or even the late arrival of the lead Panda.

There has been a lot of cases of misconduct by servitors showing their dominance to the devotees. There are also instances of servitors resorting to violence if devotees refuse to pay Dakshina. Servitors frequently point the finger at the administration for their current situation due to their low wages.

Ensuring sufficient resources, enforcing strict regulations and increasing wages of servitors would possibly improve the behaviour of servitors towards devotees and also ensure timely conductance of rituals.

Emergency contingency plan

A contingency plan is a plan that helps prepare for unexpected events or emergencies. It clearly outlines procedures to be followed in case of an emergency situation. This proactive effort of training the staffs with emergency procedures would ensure coordinated and efficient response. Contingency plan should cover the following key aspects:

- Evacuation Procedures- clearly defining evacuation routes for devotees, train personnel to guide devotees
- Communication Plan- setting up of effective communication channels to drive and evacuate the crowd during emergency, call up ambulances and nearby hospitals about the emergency, blocking up of Bada danda for movement of emergency vehicles.
- Resource allocation- keeping multiple beds ready in nearby hospital, having ambulances available, first aid kits inside the temple premises etc.

Regular drills and training sessions for staff and volunteers can help familiarize them with the contingency plan, ensuring a smooth implementation in case of an actual emergency.

Facilities and Amenities

To ensure a comfortable and enjoyable darshan experience for devotees, amenities like shades and canopies (which are currently present only in selected areas) can be installed wherever possible, especially in the queueing zones. The queue zone at Baisi Pahacha is uncovered and also has no drinking water facility which poses huge risk to devotees' health (e.g. Sun/heat stroke could occur). Installation of shades, canopies or Mist fans like those installed in Meccah, can provide relief to devotees standing in queues in hot summers.

Setting up of lost and found stalls can be helpful in reuniting devotees with their misplaced or lost belongings, thereby reducing distress and inconvenience during their visit to the temple.

Providing adequate amenities, establishing effective communication channels, and implementing robust emergency response protocols not only enhance the overall experience for devotees but also contribute significantly to their safety and well-being. By addressing these critical aspects, temple authorities can create good impression on devotees while spiritually fulfilling them.

Appendix 1: Tokenized entry system (Q&As)

1. By just obtaining a token, what difference am I expecting to see compared to the regular system?
A. Let us say you arrived in Puri at 8AM and started standing in queue at 9AM, and you got darshan at 12PM by the regular system. In a tokenized system, you would still get a Darshan at 12PM (assuming your slot is 12PM), just that you don't have to wait the whole time from 9AM to 12PM locked in the queue in uncertainty of when you would be getting a darshan. In the regular queue system, if you lose your position in the queue, you would have to start back all over again, whereas, the queue in case of tokenized entry would consist of fewer number of people of the same slot, you would certainly get you darshan in your designated timeslot.

2. As mentioned above, Token system would be obsolete during regular days and hence the paper suggests for the system to be applied only during Special occasions expecting huge turnout. Wouldn't people be unaware of the system that is not used on regular basis?
A. This is an introductory problem and would not be faced in the long term. We can publicize this protocol by advertising it in newspapers, TV and other forms of media before the event to minimize the consequences of this problem. Initially mock ticketing rounds can be conducted for people to understand the system and ticketing system. For initial few times, token centres can be set up in the viscinity of temples (with limited ticket supply) to facilitate those unaware of the system with clearly educating them about the procedure in future. Furthermore, word of mouth and first hand experience would also go a long way in this matter. As time progresses, this norm will become common knowledge, and people will follow accordingly.

3. Would you charge us for the Tokens in online or offline mode?

A. It's entirely within the administration's discretion whether to charge or not. The working of the system is totally independent of the token's monetary value. The token system would work with the same efficacy in both cases.

4. What if tokens are left unsold /unallocated at some offline centers and in huge demand at some other offline centers?
A. One possible implementation of offline token distribution would be maintaining a central repository of limited number of barcodes for tokens. When a devotee buys a token from the centre by producing an ID card, an unmapped token barcode is printed out on a sheet and handed over to them. The barcode is then mapped to their ID number. This system would ensure no unsold tokens.

5. How can a devotee residing out of Odisha incapable of online booking obtain a ticket?

A. They can possibly take assistance of third party internet cafes to book online tickets on their behalf.

Conclusion

Effective crowd management is essential for ensuring a safe, orderly, and fulfilling experience for the millions of devotees visiting the revered Puri Jagannath Temple. This study has made efforts to address problems with the current management practices by suggesting solutions tailored to the temple's unique challenges and visitor demography.

The first chapter has proposed crowd monitoring systems, that leverages technologies like computer vision, thermal cameras and RFIDs to track down section of visitors vulnerable to getting lost. It also encororages the use of machine learning algorithms to predict stampedes and future devotee turnouts.

To streamline the darshan experience and alleviate overcrowding, the study recommends a tokenized entry system during special occasions. By implementing a time-slotted approach with a capped number of devotees per slot, the temple can ensure public safety while minimizing lengthy waiting periods. This system, complemented by effective crowd flow management techniques, signage, and personnel deployment, can create a seamless and organized experience for devotees. Furthermore, the study emphasizes the importance of essential support services and amenities to enhance the overall visitor experience.

While the proposed solutions address the key challenges, it is crucial to acknowledge the limitations of the study- which is the neglection of viewpoints and perspectives of preists, temple staffs, and administrators about crowd management.

Limitation of the study

One of the key limitations of this study is the lack of adequate consideration given to the perspectives and needs of the priests and temple staff in the proposed crowd management solutions. While the report primarily focuses on enhancing the experience and well-being of the devotees, the report neglects to gather input from the priests, temple administrators, and other staff members who play a crucial role in the day-to-day functioning of the temple.

Effective crowd management solutions require a holistic approach that considers the viewpoints and requirements of all stakeholders involved. By overlooking the perspectives of the priests and temple staff, the proposed solutions may inadvertently create additional burdens or difficulties for them, potentially hindering their ability to perform their duties efficiently and maintain the spiritual essence of the temple.

To address this limitation, it is recommended that future studies or subsequent phases of this project actively engage with the priests, temple authorities, and staff members. Their insights, concerns, and recommendations should be thoroughly examined and incorporated into the crowd management strategies.

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